

Laboratory Research, Field Investigation, And Training Program

*of the Robert A. Taft
Sanitary Engineering Center
at Cincinnati, Ohio*

THE Public Health Service's Robert A. Taft Sanitary Engineering Center (until recently the Environmental Health Center) in Cincinnati, Ohio, is dedicated to research, field investigations, and training in the sanitary sciences as related to man's contact with air, water, food, wastes, and ionizing radiations. It is the only laboratory in the Nation to attempt a coordinated study of the health significance of physical, chemical, and biological forces in the environment.

Dramatic population changes, growing industrialization, increasing use of atomic energy, and other factors in modern civilization are making it daily more important that the effects of the environment on the Nation's health be understood and that the Nation develop and apply the necessary control techniques to assure a healthful environment for its population.

In recognition of these needs, the 80th Congress authorized the construction of a new headquarters and laboratory building, designed to meet the specialized and technical requirements of the scientists and engineers engaged in the center's research and training program. In the past, men at the Cincinnati station, even though working in widely scattered and inadequate facilities, contributed materially to the development of methods, techniques, and in-

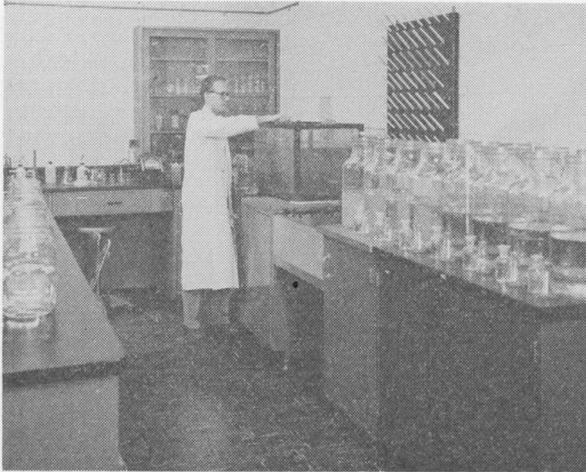
strumentation to assure safe supplies of milk and drinking water, safe handling of food at eating places, and abatement of water pollution.

The program has steadily broadened in scope. To meet present needs, the center is turning its attention to such problems as waterborne virus diseases (infectious hepatitis, for example); waterborne toxins generated by algal growths; hazardous chemicals in the water supply and in the atmosphere; control of environmental radiation hazards which have been accentuated by the growth of the atomic energy industry; and the development of rapid, automatic and economical means for detecting and measuring contaminants in air and water by use of modern electronic techniques, such as the use of infrared waves to "fingerprint" bacteria.

One study which should repay the cost of investigation many times over is the application of a molecular filter which strains out all bacteria from drinking water. This filter offers major economies to public waterworks in providing a more rapid and economical method of examining water for bacteria. It can be used to insure the safety of drinking water taken from wells, lakes, and springs.

Better methods for detecting, controlling, and remedying water pollution have long been pursued by the center. Some lines of this endeavor have been the development of new and improved analytical techniques; studies of sewage and industrial waste treatment processes; studies of the ability of streams to purify themselves naturally. A systematic study of industrial wastes, in collaboration with industry as-

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To evaluate toxicity of specific types of wastes to fish or other aquatic life, biologists at the center place fish in a group of jars containing progressively decreasing concentrations of test material. The fish are observed for various periods to determine percentage surviving at each concentration.

sociations, individual industrial plants, the National Technical Task Committee on Industrial Wastes, and others, has been a major responsibility of the center. A series of industrial waste guides has been published for technical use.

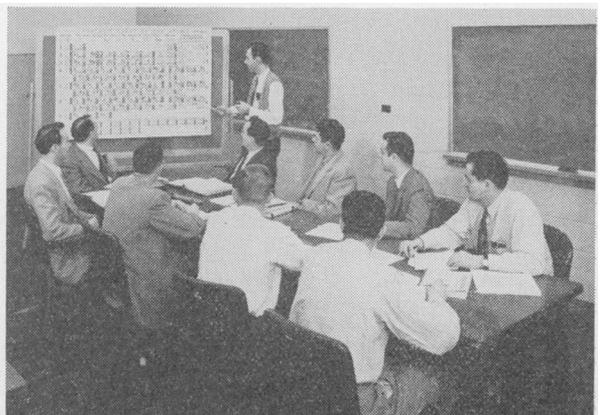
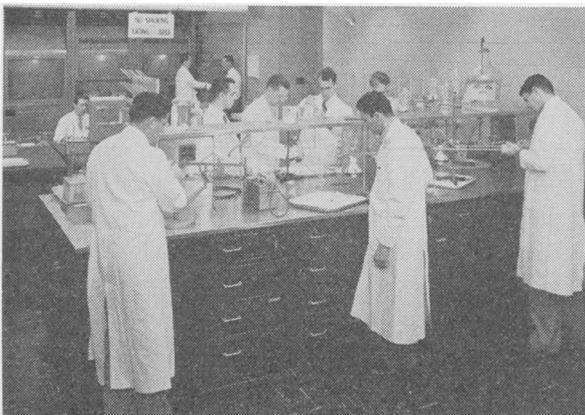
Of particular professional interest is the center's training program for State and local health workers in advanced sanitation and radiological health subjects. During the past 5 years, 160 training courses have been conducted. They have been attended by more than 6,300 public health specialists from the 48 States and



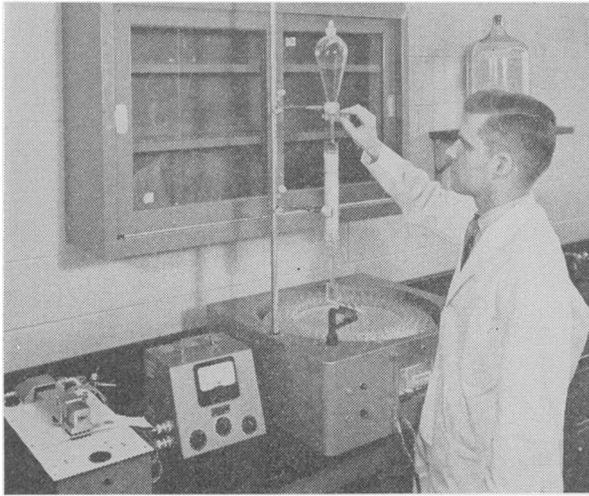
High-volume air sampler collects particles of solid matter from air drawn through fiber glass mat on front of sampler. Particulate matter collected by these instruments in 22 communities is sent to the center for analyses of organic and inorganic content, bacteria, pollens, proteins, and radioactivity.

many foreign countries. The new laboratories are equipped with unique "classroom labs" for the accommodation of the trainees. These courses have proved invaluable in providing the center with another way of making research results available to sanitary engineers and allied professional workers for practical and widespread use in controlling health hazards.

Intensive research into environmental factors is new in the health field. There are many unknowns to challenge the investigator and many methods of approach to them. Important by-products of research in the Cincinnati labora-



Left: Training courses at the center give health workers knowledge and techniques to solve environmental health problems. Right: Trainees discuss chemistry of ionizing radiations as related to public health.



Automatic fractionator being used to separate a mixture of bacterial toxins to obtain specific toxins responsible for food poisoning symptoms.

tories may, in the future, reveal clues to the mysteries of the present day “killers” and “cripplers”—poliomyelitis, heart disease, and cancer. What is the role of the water we drink, the air we breathe, and the food we eat in relation to these diseases?

Research Projects

Below is a list of the research and investigation projects which the Sanitary Engineering Center is currently conducting or has recently completed.

Methodology

Appraisal of sanitary engineering research.

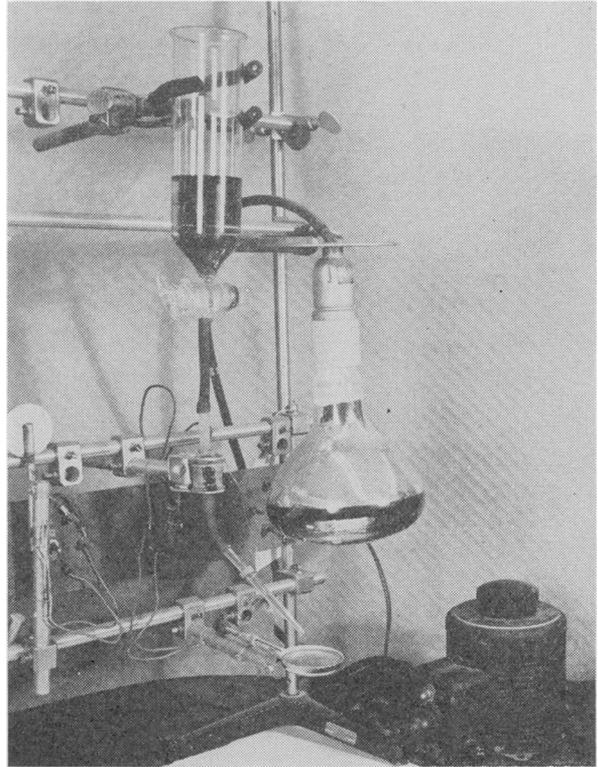
Development of differential media for the enumeration of coliform organisms in water, air, milk, and shellfish, using membrane filter techniques.

Application of infrared absorption spectrophotometry to the rapid identification of microorganisms.

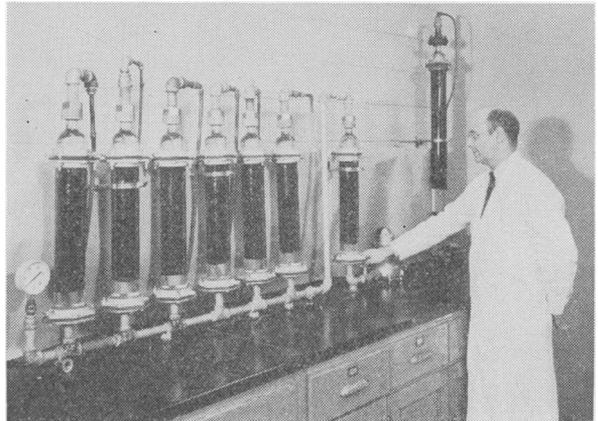
Adaptation of tissue cultures from human and animal tissues for the investigation of sanitation practices as related to the control of infectious hepatitis.

Analysis of virus-infected cells by means of polaroid color-translating ultraviolet microscopy and microspectrophotometry.

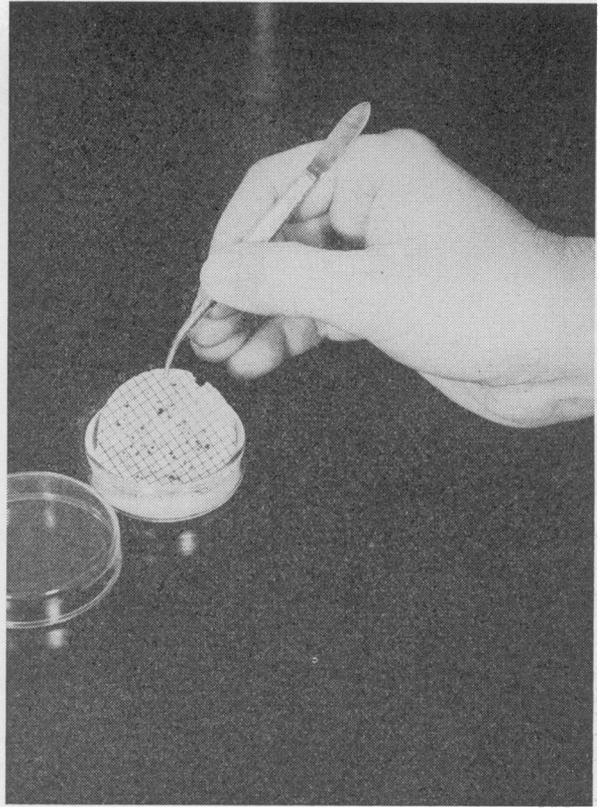
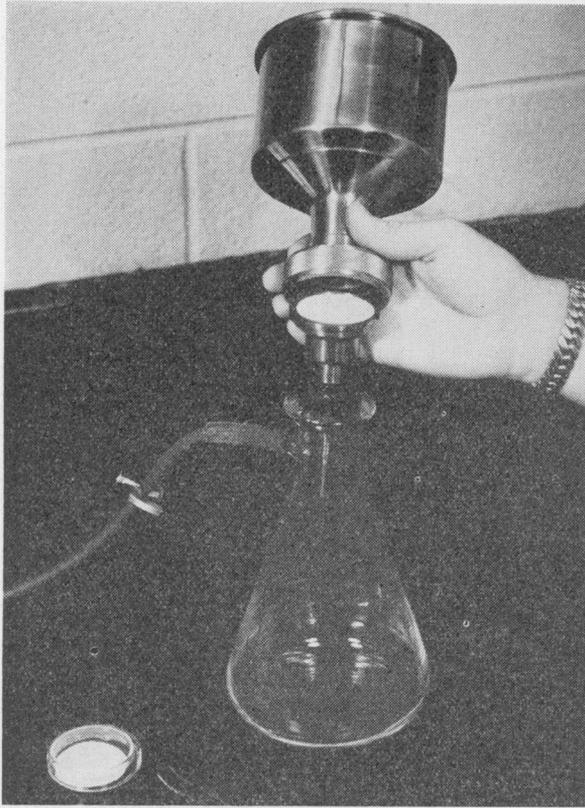
Evaluation of media for the maximum produc-



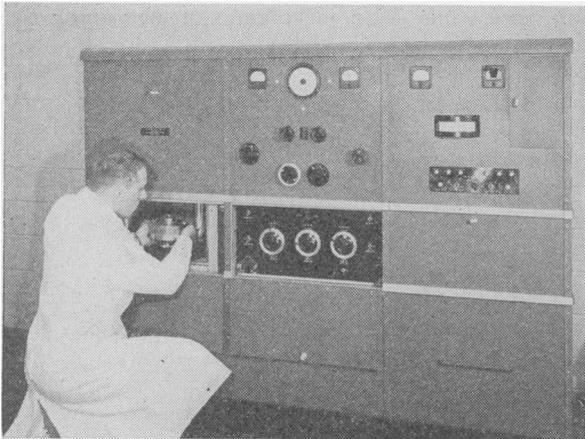
Measuring radioactivity of water requires great concentration of material by evaporation. Water from sample flows into small pan under heat lamp. When enough water has entered, the pan tips, shutting off the flow by breaking an electrical circuit. After some water has evaporated, pan is raised automatically, closing circuit, and admitting more water. Large volumes of water may be evaporated quickly with a minimum of handling.



Carbon filters concentrate minute quantities of organic materials from water. Such materials often causing taste and odor in water may be identified by analyzing concentrates.



Membrane filter allows rapid, accurate counting and identification of bacteria in water. Water poured in at top passes through filter. Bacteria are caught by filter, which is removed and placed on pad of nutrient material so that bacteria may develop into colonies. After incubation, each organism trapped on membrane filter grows into a visible colony. These can be counted to determine number of bacteria in water sample.



Ultracentrifuge.

tion of fungi and inhibition of bacteria as related to study of the role of fungi in environmental health.

Development of a continuous indicating and

recording instrument for measuring the dissolved oxygen content of industrial wastes and surface waters.

Development of chemical and spectrographic analytical methods for the microquantitative determination of organic and inorganic substances in water and air.

Study of factors affecting adsorption and elution of organic materials from carbon filters. Study of the application of disinfecting procedures to bedding and upholstery materials.

Assessment of effectiveness of germicides under various use conditions: quaternary ammonium compounds, silver containing substances, and iodine.

Air Pollution

Collection, separation, and analysis of particulate impurities in the air (sampling stations in 23 communities in the United States and Alaska).

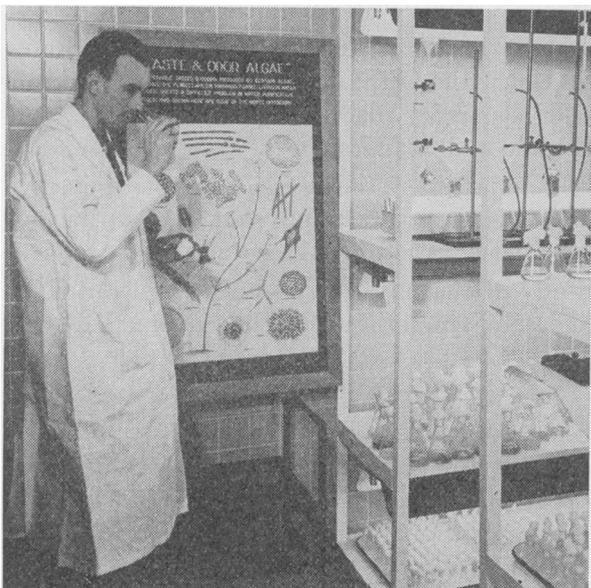
International Joint Commission (United States Section) study of air pollution in the Detroit-Windsor area (Detroit, Mich.).

Review of available information on the public health aspects of community air pollution.

Radioactivity survey of the dust, air, rain, and snow in the atmosphere over Cincinnati.

Food Sanitation

Biochemical detection of toxins causing food poisoning.



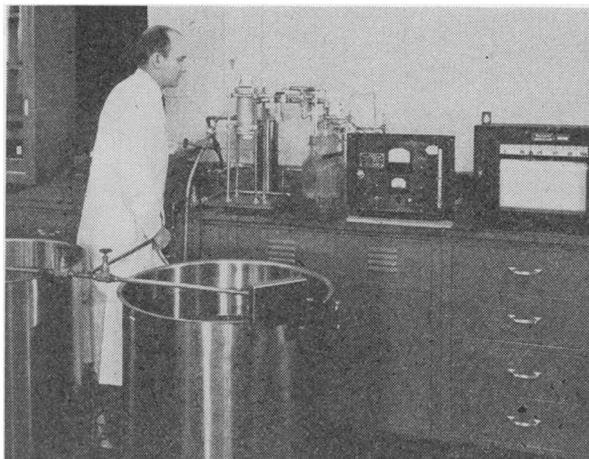
Single species of algae, which may cause taste and odor problems, being isolated and cultivated in the laboratory to develop new and improved control methods.

Microbiological and immunological methods for rapid detection of food-poisoning bacteria. Study of the pollution and natural purification of shellfish in aquatic environments (Pensacola, Fla.).

Sanitary evaluation of commercial methods of harvesting, processing, and marketing shellfish (Pensacola, Fla.).

Improvement of phosphatase and other biochemical and microbiological measures for the safety of milk and processed foods.

Evaluation of the effectiveness of commercial milk pasteurization on the destruction of the causative agent of Q fever; cooperative project with University of California (Davis, Calif.).



Apparatus gives a continuous record of dissolved oxygen content of surface waters in lakes and streams, an important indicator of their suitability for various uses.

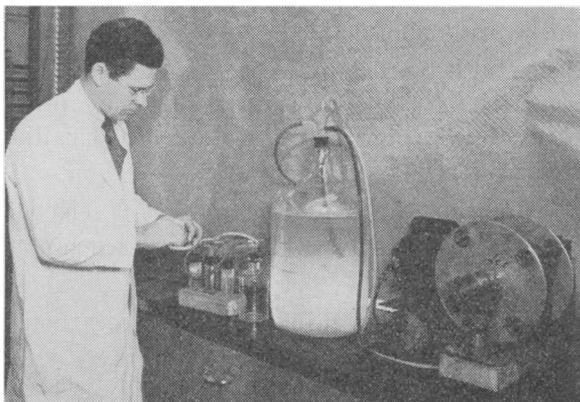
Waste Disposal

Studies of industrial waste sources, characteristics, and corrective measures.

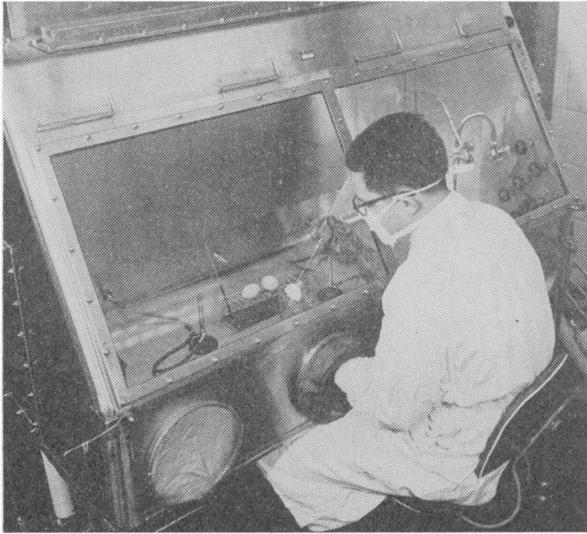
Evaluation of the effectiveness of selected municipal sewage treatment processes.

Studies of subsurface household sewage disposal systems.

Methods for the treatment of radioactive wastes; cooperative project with Atomic Energy Commission (Los Alamos, N. Mex., Oak Ridge, Tenn., and Cincinnati, Ohio).



Part of equipment used in studying persistence of oils in water. Oils are mixed with water in the carboy and mixture is agitated by the recirculating pump. Rate of oil decomposition is checked periodically by analyzing samples for oil content and by measuring decomposition gases which are absorbed in the liquids in the bottles.



Virologist working under specially designed safety hood inoculates infectious virus into fertile eggs, where it will multiply.

Application of physical, chemical, and biological methods to the treatment of aircraft cleaning wastes and determination of their toxicity to fish before and after treatment.

Water Pollution

The exploration and evaluation of biological indexes of water pollution.

Bioassay studies to determine the toxicity to fishes of complex cyanides, beryllium, uranium, and less common metals.

Basic studies in fish toxicology and physiology as related to water pollution; cooperative project with Oregon State College (Corvallis, Oreg.).

Investigation of the toxicity to fishes of selected dieldrin formulations and of the surface runoff from treated areas.

The persistence of lignin, neutral hydrocarbons, and other substances in surface waters.

Studies of the survival of Coxsackie virus in polluted waters.

Evaluation of mold populations in sewage and

polluted streams in search of natural reservoirs of pathogenic fungi.

Studies on the relation of molds common in sewage, polluted water, and sewage treatment plants to the degradation of suspended and dissolved solids and on the role of fungi in natural purification of streams.

Studies of the relationship between quality of natural swimming waters and health.

Exploratory study of the effects of detergents on sewage treatment and water purification.

Roanoke River water pollution study.

International Joint Commission (United States Section) study of water pollution in the Detroit and Niagara Falls areas (Detroit, Mich., and Buffalo and Niagara Falls, N. Y.).

Columbia River studies concerned with observable effects of radioactivity on a stream receiving nuclear reactor cooling waters.

Study of the physical, chemical, and radiobiological characteristics of the Savannah River.

Water Supply

Study of physical and carrier precipitation methods for removing radioactive contamination from water; cooperative project with Oak Ridge National Laboratory (Oak Ridge, Tenn.).

Study of the suitability of the Scioto River and adjacent ground water as possible sources of drinking water supply for the Atomic Energy Commission plant near Piketon, Ohio (Waverly, Ohio).

Exploratory studies on the survival of *Histoplasma capsulatum* in water.

Effects of chlorine disinfection on the inactivation of Coxsackie virus in water.

Identification and culturing of organisms (algae) producing nuisance conditions in water supplies and the development and evaluation of control procedures.

Determination of the chemical nature and sources of organic substances in industrial wastes, surface waters, and water supplies.